P2 9.4
6395.11 IR00023

Building 2-68
Underground Fuel Storage Tank
Soil Removal Completion Report

Boeing Plant 2
Seattle/Tukwila, Washington

Submitted To:
The Boeing Company

June 2000

WESTON MANAGERS DESIGNERS/CONSULTANTS

Building 2-68
Underground Fuel Storage Tank
Soil Removal Completion Report

Boeing Plant 2
Seattle/Tukwila, Washington

Submitted to

The Boeing Company
Seattle, Washington

June 2000

Prepared by

Roy F. Weston, Inc.
700 Fifth Avenue
Suite 5700
Seattle, WA 98104-5057

WO 3709-034-412-0030

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

bgs	Below Ground Surface
Boeing	The Boeing Company
MTCA	Model Toxics Control Act
NWTPH-Dx	Northwest Total Petroleum Hydrocarbons Diesel Extended
OA	Other Area
Facility	Plant 2 Facility
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facilities Investigation
TPH	Total Petroleum Hydrocarbons
UST	Underground Storage Tank
WESTON	Roy F. Weston, Inc.

BUILDING 2-68
UNDERGROUND FUEL STORAGE TANK
SOIL REMOVAL COMPLETION REPORT

BOEING PLANT 2

1. INTRODUCTION

This Soil Removal Completion Report describes the work performed to remove soil impacted with petroleum hydrocarbons. The impacted soil was located on The Boeing Company's (Boeing's) Plant 2 Facility (Facility).

Boeing Plant 2 is located at 7755 East Marginal Way South, Seattle, Washington (Figure 1). The tank was located east of and adjacent to Building 2-68 in the southernmost portion of Plant 2 along the eastern boundary of the Facility (Figure 2). Surrounding land use is predominantly industrial.

The southern portion of Boeing Plant 2 is under redevelopment. Existing buildings are being removed and new buildings and underground utilities are being constructed. During installation of an underground utility line in July 1999, soil containing total petroleum hydrocarbons (TPHs) was discovered.

The source of the TPH is believed to be a former underground storage tank (UST). A "hold down" pad with tank saddles was found during soil removal indicating a tank had been located in this area.

Soil that contained petroleum hydrocarbons greater than 200 mg/kg (Model Toxics Control Act [MTCA] Method A cleanup level) was removed. TPH concentrations in the remaining soil were verified through confirmatory sampling.

1.1 Background

Boeing observed petroleum hydrocarbons in soil on July 27, 1999 during utility trench excavation east of Building 2-68. The trench was required to install an underground duct bank. A backhoe operator was excavating the utility trench through sand when imported granular structural fill (peagravel) was encountered east of Building 2-68. The granular fill was clean (i.e., no visible staining) to a depth of 7 feet below ground surface (bgs). Below 7 feet, the fill contained visible petroleum hydrocarbons.

The fill containing petroleum hydrocarbons was segregated from the clean fill. The fill became heavily stained at depths below 7 feet. As excavation continued downward, a large concrete slab with tank saddles (used as a "hold down" to prevent the former tank from floating under high groundwater conditions) was located at a depth of approximately 10 to 11 feet bgs. A dark heavy oil was observed floating on groundwater within the excavation. Upon finding the slab and oil, work in this area was stopped. The excavation was approximately 30 feet long by 24 feet wide.

A Bunker C fuel oil tank was formerly located at this site. The date of removal of this tank is unknown and no removal documentation was available. Peagravel had been used to backfill the excavation during removal of the tank. Soil in the vicinity of the former tank location consisted of sand.

The concrete slab and tank saddles were found approximately 40 feet northeast of Other Area (OA) 10 (former UST PL-20). Soil samples were collected near OA 10 as part of the Resource Conservation and Recovery Act (RCRA) Facilities Investigation (RFI) for Plant 2 (WESTON 1997). Soil boring SB-08012 was advanced northeast of OA 10 in close proximity to the location where the TPH was observed. Analysis of soil samples collected at 5 and 7.5 feet bgs from SB-08012 did not detect TPHs.

Figure 3 shows the location of RFI soil samples taken in the area near this former UST.

1.2 Cleanup Objectives

Cleanup objectives were developed upon discovery of the stained soil and floating oil. The cleanup objectives were to:

- Objective #1—Excavate as much of the impacted soil as possible.
- Objective #2—Remove soil with TPH concentrations greater than 200 mg/kg.
- Objective #3—Remove the floating oil.

2. DESCRIPTION OF WORK COMPLETED

A meeting of Boeing, FOSS Environmental, and Roy F. Weston, Inc. (WESTON®) representatives was held on July 28, 1999 to develop a plan for removal of the oil and impacted soil. The plan consisted of removing the oil from groundwater using absorbent pads and booms and skimming by vacuum truck. The depth to groundwater was approximately 10 feet bgs. Soil containing petroleum hydrocarbons would be excavated until visual evidence indicated the affected soil had been removed. When excavation was complete, confirmatory sidewall samples would be collected and analyzed for TPH to confirm acceptable concentrations of TPH remained. No bottom samples were to be collected due to the presence of the concrete slab and depth below the water table.

Work began on July 29th. Treated dimensional timber (possibly timber cribbing) was observed at the depth of the groundwater table. The timbers extended north-south along most of the west wall of the excavation. The north wall of the excavation was nearly vertical abutting the edge of a road. Building 2-68 was located to the west. East and south of the excavation were clear of obstructions.

Some of the timbers in the west wall of the excavation were removed and the wall was excavated 2 to 3 feet in the west direction. Attempts to remove the remaining timbers located within the west wall of the excavation resulted in partial collapse of the excavation wall which jeopardized the integrity of the Building 2-68 foundation. Excavation was stopped and the remainder of the timbers were left in place to maintain to the wall's stability. The majority of oily soil was

removed (based on visual observations); however, some stained soil was left due to building stability concerns.

The north wall consisted of peagravel, and as a result, excavation near the bottom of the wall caused the upper wall material to "slide" into the excavation area. A short section of the north wall was removed (approximately 1 foot thick by 8 feet long) and excavation was stopped. Points of failure began appearing in the road bed located adjacent to the excavation such that continued excavation would jeopardize the road's functionality. No further excavation was performed on the north wall; however, all oily soil was removed from the north wall except in the northwest corner where slightly stained soil remained.

Groundwater was skimmed to remove oil throughout the excavation process by means of a hose attached to a vacuum truck.

The south wall contained timbers and a considerable quantity of broken dimensional lumber covered with oil. The soil surrounding the lumber contained oil product. Excavation proceeded south until the soil contained no visual evidence of oil. A soil sample was collected 1 foot above the water table from both the south wall (SB-06804) and west wall (SB-06805).

Excavation continued on July 30th. Soil was removed from the northeast corner of the excavation until it was free of visible staining.

Clean structural overburden (i.e., free of visible staining) 0 to 5 feet bgs was then removed from the east wall and set aside. Four feet of soil was subsequently removed in the horizontal direction from the east wall. At this point, oil staining was not observed in the east wall. A soil sample was collected 1 foot above the water table from the middle of both the east (SB-06806) and north wall (SB-06807).

The final excavation was irregular in shape and was approximately 43 feet long by 32 feet wide. The "hold down" pad was not removed from the bottom of the excavation. Figure 4 shows the excavation configuration and location of confirmatory samples.

3. DISPOSAL

Approximately 175 cubic yards of impacted soil were excavated from the former tank site, and 300 gallons of oily water were pumped from the excavation. The impacted soil was disposed of offsite at a permitted disposal facility. The oily water in the vacuum truck was sampled, analyzed and disposed of in accordance with applicable regulations.

Table 1 lists the disposal unit quantities and their disposal site.

Table 1—Disposal Quantities and Disposition

Material	Quantity	Disposal Company/Site
TPH Impacted Soil	175 cubic yards	Waste Management Inc., Columbia Ridge Landfill, Oregon
Oily water	300 gallons	Philip Environmental Corporation

4. SAMPLE METHODS AND ANALYTICAL DATA

Four soil samples were collected from the excavation. All samples were collected at a depth of approximately 9 feet bgs. Samples were collected using the bucket of the backhoe due to the depth of excavation. The samples were placed into glass jars and sent to Analytical Resources, Inc. in Seattle, Washington for TPH analysis using Method Northwest Total Petroleum Hydrocarbons Diesel Extended (NWTPH-Dx).

A summary of the analytical data is presented in Table 2. Laboratory data is provided in Appendix A.

Table 2—Confirmatory Sample Results

Location	Soil Sample Number	TPH Concentration (mg/kg)
South Wall	SB-06804	11U
West Wall	SB-06805	123
East Wall	SB-06806	12U
North Wall	SB-06807	10U

U - Compound not detected at the given detection limit using Method NWTPH-Dx.

5. SUMMARY

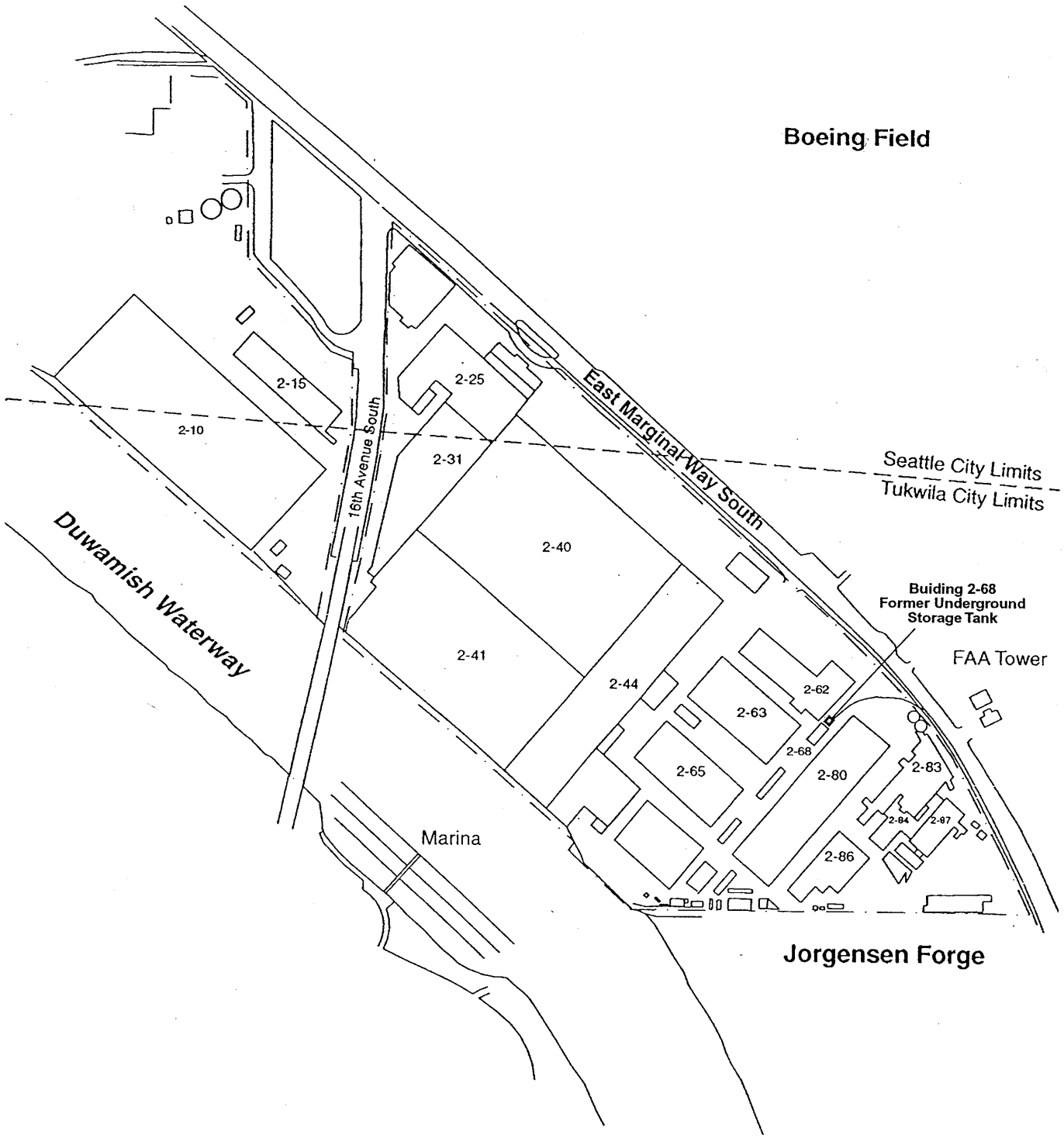
The objectives of the removal were achieved.

- Objective #1 was met by removing the majority of soil, which contained petroleum hydrocarbons. Soil was excavated west and north until surface structures were encountered. Approximately 175 cubic yards of soil containing TPH was removed and disposed of offsite at a permitted landfill.
- Objective #2 was met. Soil remaining in the area of the former tank hold down pad has TPH concentrations less than the MTCA Method A criteria of 200 mg/kg.
- Objective #3 was met. All oil present on the surface of groundwater was removed. Approximately 300 gallons of oily product and water were removed from the excavation.

6. REFERENCES

WESTON (Roy F. Weston, Inc.). 1997. RCRA Facility Investigation Soil Investigation Interim Report, Boeing—Plant 2, Seattle/Tukwila, WA. Prepared for The Boeing Company, Boeing Information Support Services, Safety, Health, and Environmental Affairs, Seattle, WA. Roy F. Weston, Inc., Seattle, WA. August.

FIGURES



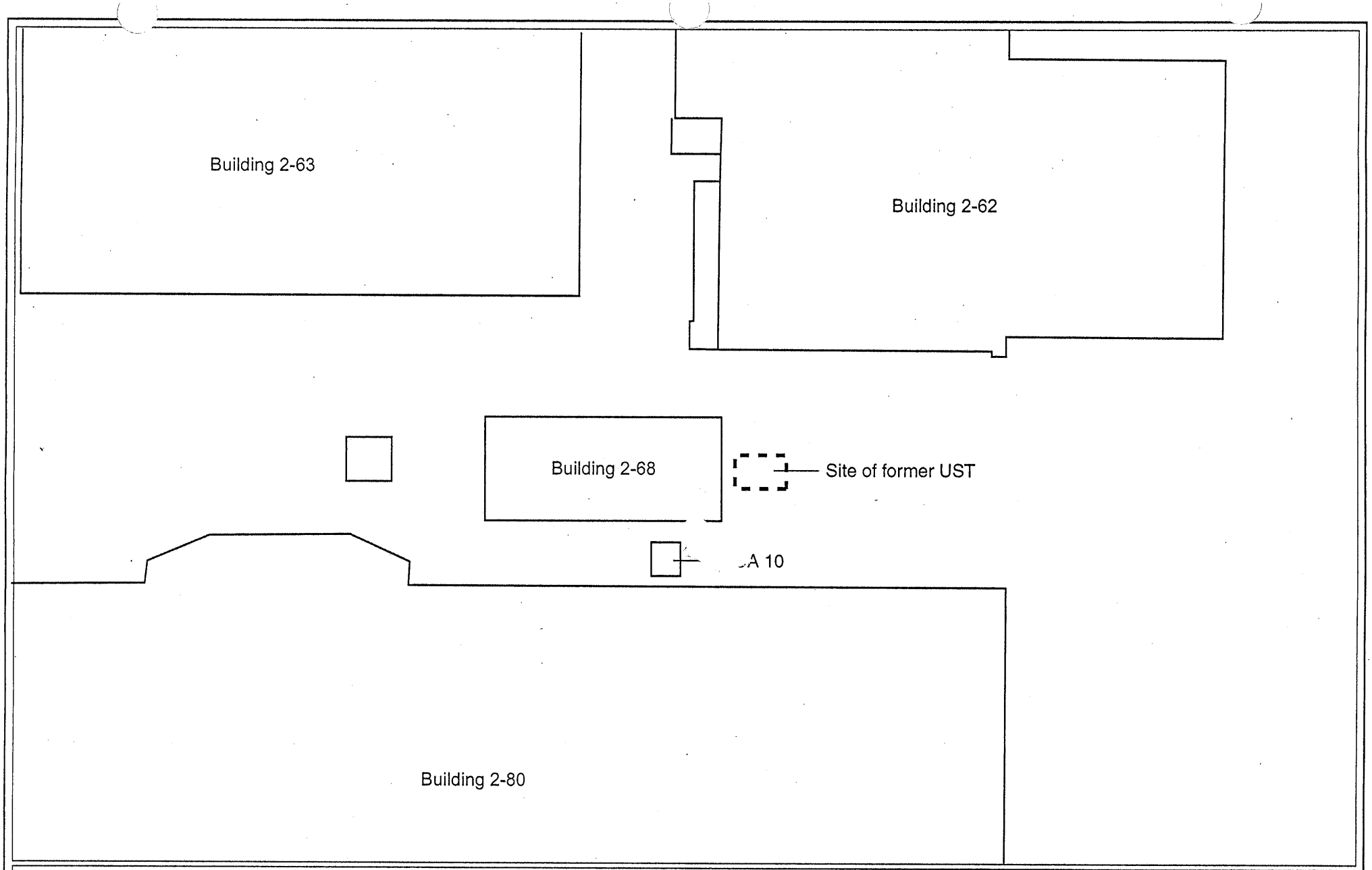
Facility Map

N

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Figure
1

00-0153 Fig1.ai



0 25 50

Scale in Feet

WESTON®

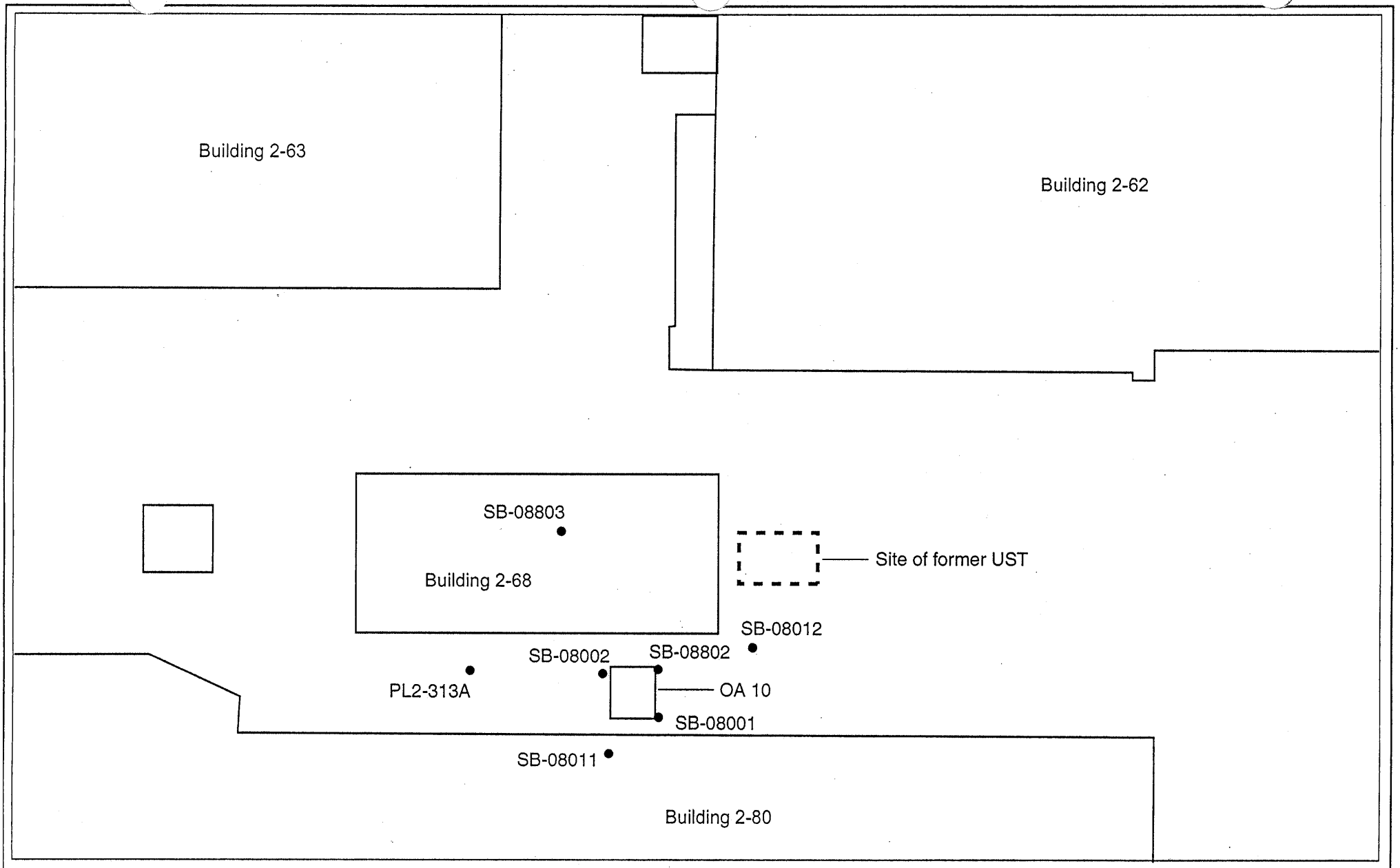
MANAGERS DESIGNERS/CONSULTANTS

Site Location

Figure

2

00-0153 Fig2.ai



0 25 50

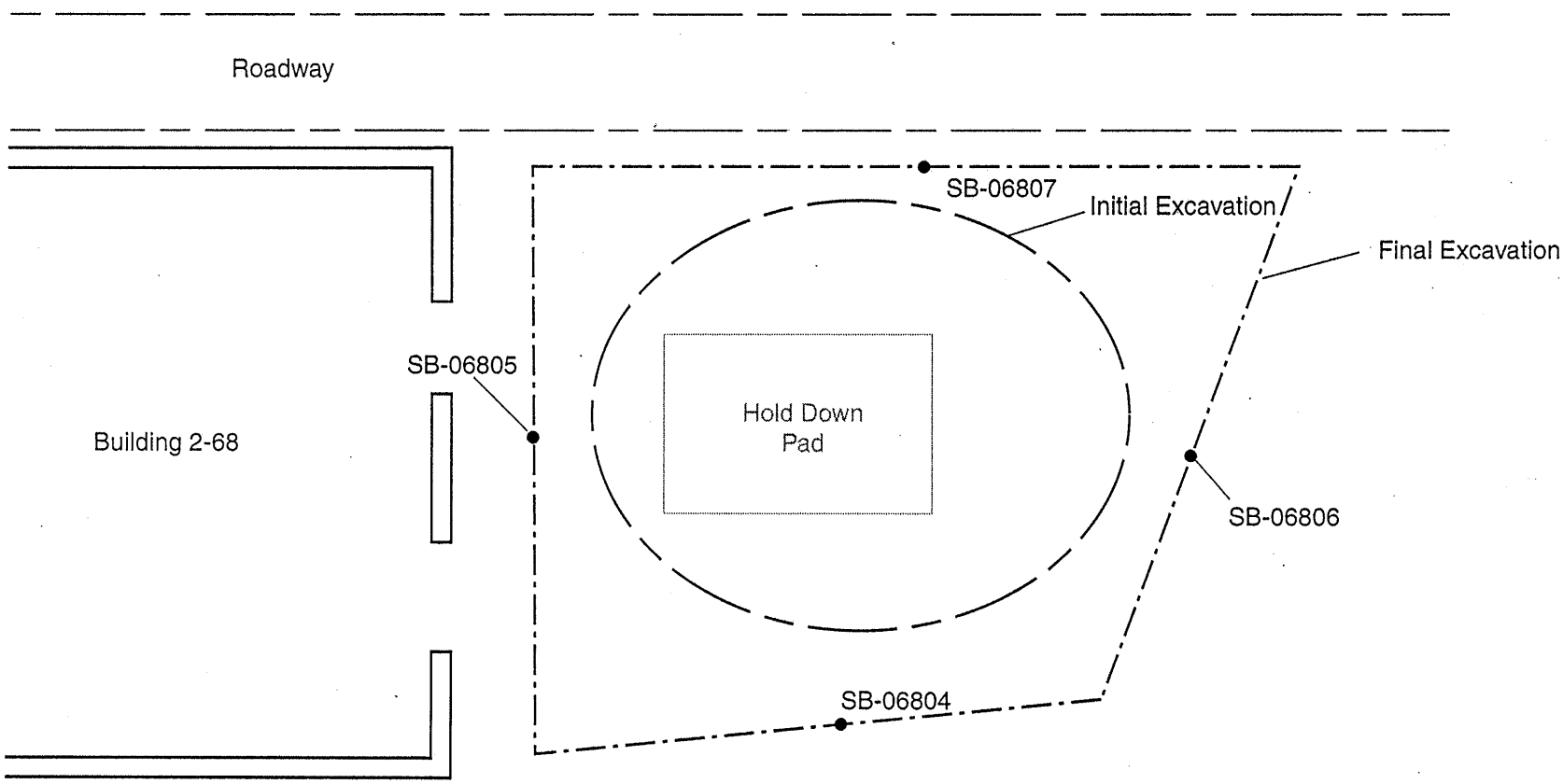
Scale in Feet

WESTON® MANAGERS DESIGNERS/CONSULTANTS

RFI Soil Sample Locations

● Soil Sample Location and Sample Number

Figure 3



0 5 10

Scale in Feet

● Confirmatory Soil Samples

Final Excavation Limits

Figure
4

WESTON®
MANAGERS DESIGNERS/CONSULTANTS

00-0153 Fig4.ai

APPENDIX A

SOIL SAMPLING DATA

ANALYTICAL
RESOURCES
INCORPORATED

TOTAL DIESEL RANGE HYDROCARBONS
WA TPHd Range C12 to C24 by GC/FID
and Motor Oil

LIMS ID: 99-11143
Matrix: Soil

QC Report No: AO71-Boeing
Project: BLDG 268 CONSTRUCTION

Data Release Authorized:
Reported: 08/03/99

Date Received: 07/30/99

Lab ID	Sample ID	Date Analyzed	Dilution Factor	Diesel Range	*HC ID	Motor Oil Range	Surrogate Recovery
AO71MB	Method Blank	08/02/99	1:1	5.0 U	---	10 U	93.0%
AO71A	SB06806	08/02/99	1:1	6.1 U	---	12 U	86.0%
AO71B	SB06807	08/02/99	1:1	5.1 U	---	10 U	91.0%

Values reported in ppm (mg/kg) on a dry weight basis.

Surrogate is Methyl-Arachidate.

* ID indicates, in the opinion of the analyst, the petroleum product with the best pattern match. 'NO' indicates that there was not a good match for any of the requested products.
Diesel quantitation on total peaks in the range from C12 to C24.
Motor Oil quantitation on total peaks in the range from C24 to C38.

Data Qualifiers

U	Compound not detected at the given detection limit.
J	Indicates an estimated value below the calculated detection limit.
S	No value reported due to saturation of the detector. Dilution required.
D	Indicates the surrogate was not detected because of dilution of the extract.
E	Indicates a value above the linear range of the detector. Dilution required.
NR	Indicates no recovery due to matrix interference.
B	Indicates compound also detected in the method blank.

ANALYTICAL
RESOURCES
INCORPORATED

TOTAL DIESEL RANGE HYDROCARBONS
WA TPHd Range C12 to C24 by GC/FID
and Motor Oil

LIMS ID: 99-11035
Matrix: Soil

QC Report No: AO57-Boeing
Project: BLDG 268 CONSTRUCTION

Data Release Authorized: Cindy Roberts
Reported: 08/02/99

Date Received: 07/29/99

Lab ID	Sample ID	Date Analyzed	Dilution Factor	Diesel Range	*HC ID	Motor Oil Range	Surrogate Recovery
AO57MB	Method Blank	07/30/99	1:1	5.0 U	---	10 U	96.0%
AO57A	SB06804	07/30/99	1:1	5.4 U	---	11 U	79.0%
AO57AD	SB06804-DUPL	07/30/99	1:1	5.4 U	---	11 U	78.0%
AO57B	**SB06805**	08/02/99	1:1	**42**	NO	**81**	76.0%

Values reported in ppm (mg/kg) on a dry weight basis.

Surrogate is Methyl-Arachidate.

* ID indicates, in the opinion of the analyst, the petroleum product with the best pattern match. 'NO' indicates that there was not a good match for any of the requested products.
Diesel quantitation on total peaks in the range from C12 to C24.
Motor Oil quantitation on total peaks in the range from C24 to C38.

Data Qualifiers

U	Compound not detected at the given detection limit.
J	Indicates an estimated value below the calculated detection limit.
S	No value reported due to saturation of the detector. Dilution required.
D	Indicates the surrogate was not detected because of dilution of the extract.
E	Indicates a value above the linear range of the detector. Dilution required.
NR	Indicates no recovery due to matrix interference.
B	Indicates compound also detected in the method blank.